

THURSDAY, SEPTEMBER 4, 1884

FUNGI AND BACTERIA

Vergleichende Morphologie und Biologie der Pilze, Mycetozoen, und Bacterien. By A. De Bary. (Leipzig: Engelmann, 1884.)

THOSE of us who have been awaiting the publication of a new edition of De Bary's "Morphologie und Physiologie der Pilze, Flechten, und Myxomyceten" of eighteen years ago, will be neither surprised nor disappointed to find that the author has felt compelled to change the title as well as to effect such important alterations in the text that the book is not only virtually but really a new one. This is, moreover, extremely satisfactory, since it shows that the province of mycology has been extended during the period named. How far this extension is due to the labours and influence of the writer of the book before us is well known to all botanists.

In some respects the general plan of the old book has been followed, and many of the woodcuts have been retained; but the large and at that time important section on the reproductive organs in the previous edition is no longer to be found as a separate part of the present book, the results of more recent investigations having completely altered the position of the question as to the sexual reproduction of the Fungi. This fact is of course also a motive in the very different views on classification held by the author now, as contrasted with those published in the earlier book. These and the addition of the Bacteria as an entirely independent group of organisms, are among the principal points of difference in the general plan of the book. That they are by no means the only changes in plan, however, is to be seen at a glance on comparing the two editions.

The present work is divided into three "Parts," devoted to the Fungi, the Mycetozoa (Myxomycetes), and the Bacteria respectively. Under the Fungi proper, there are three chapters devoted to "General Morphology," including Histology, the Segmentation of the Thallus, and the Morphology of the Spore; the latter being very fully treated of, and many new facts being added. The second part deals with the groups of Fungi themselves, and their evolution; the theoretical portions of Chapter IV. being extremely comprehensive and clear, and touching upon matters of the widest biological interest. Chapter V. deals with the various groups comparatively and in detail. Starting with the Peronosporæ, the author follows the series through the main Ascomycetous series to the Uredinæ, in conformity with his now well-known views on the classification, dealing by the way with those groups which diverge from the main series or are still doubtfully situated.

The third part of the main subject (Chapters VI. and VII.) is devoted to the physiology of the Fungi, including the phenomena of parasitism and the commensalism of the Lichens, and bringing us through by far the larger part of the book.

The *Mycetozoa* (Chapters VIII. and IX.) occupy nearly 40 pages of most interesting matter, including a discussion as to the position of these remarkable organisms, and an account of what is known as to their physiology.

The *Bacteria* or Schizomycetes are dealt with separately and in detail at the conclusion of the book. Chapter X. is devoted to their morphology, and discussions as to their position in the system, and the meaning of "species." A sharp comparison of the extreme views on this subject is dealt with shortly, and in the author's characteristic style. Probably the most fascinating chapter in the book (unless Chapter IV. be excepted) is the last one, dealing with the physiology and life-history of the Bacteria, and of course touching the subjects of pathology and adaptation to different media and conditions with a master hand; and it will be an enormous boon, and should be a stimulus, to have the facts as to the resistance of germs, conditions of development, &c., of these important organisms sifted by an author of such wide experience.

Enough has been said to show that the present book is rather to be considered as a new work than as a second edition of the "Morphologie und Physiologie der Pilze, &c." But it is not only in that so much new matter has been added and a different arrangement been found necessary that this book differs from the former one; the theoretical portions have also undergone changes even more striking and important than the statements of fact. To put the subject in the shortest possible form:—While the then recent discoveries of Pleomorphism and the reproductive organs by Tulasne and De Bary were leading mycologists to suspect that a reproductive process exists in the case of all the higher Fungi, the prominent doctrine, so to speak, in the older work was in accordance with the expectations which had been aroused. Nevertheless, no better monument to the sagacity of the author could perhaps be suggested than his careful statement of the case of the sexuality of the Ascomycetes, even in 1866.

It is well known now that the investigations of the last eighteen years have gone to show that not only do the reproductive organs gradually become simpler and finally disappear in the higher Fungi, but that the physiological processes intrusted to them fade away even earlier—the former depending on the latter, in fact. This doctrine of Apogamy, established by De Bary, of course profoundly affects the work before us. The whole subject of Pleomorphism is also now in a far better position, and we strongly recommend all young botanists to read and mark well the introduction (Chapter IV.) to the second section of this book, which contains much just and trenchant criticism on all these matters, and on past mistakes and future dangers connected with them. The notes on terminology should also be well pondered by the more reckless.

It would take too long to enter further into details as to the classification adopted. It may suffice to point out that the *Peronosporæ* (and *Ancylistæ* and *Monoblepharis*), *Saprolegnia*, *Zygomycetes*, and *Entomophthoræ* are treated as four groups, which, on account of their relations to the Algæ, may be comprehended as the *Phycomycetes*. The main line of the *Phycomycetes* leads us to the *Ascomycetes*, and, further, to the *Uredinæ*. The treatment of the enormous mass of *Ascomycetes* is masterly in the extreme, and testifies better than anything else to the progress made in the biology of these Fungi during the last twenty years. The groups mentioned are regarded as the "Ascomycetous series."

As diverging groups, or such the position of which is

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still doubtful, De Bary classifies the *Chytrideæ*, and *Protomyces*, and *Ustilagineæ*, all considered as allied phylogenetically with the *Phycomycetes*; and a series of doubtful *Ascomycetes* (e.g. Eidam's *Helicosporangium*; also *Exoascus*, *Saccharomyces*, &c.), obviously to be placed next the *Ascomycetes* proper. Finally, the huge group of the *Basidiomycetes*, which De Bary regards as connected with the *Uredineæ*, though it is not an easy matter to satisfy one's self of the alliance.

The rigour with which the literature has been sifted is shown in the references given at the end of each section. There is no doubt that Prof. De Bary may be congratulated on once more having written a work which will be a monument to his skill and industry, and a boon to all biologists.

OUR BOOK SHELF

A Monographic Revision and Synopsis of the Trichoptera of the European Fauna. First Additional Supplement (with Seven Plates). By Robert McLachlan, F.R.S., F.L.S., &c. (London: Van Voorst, 1884.)

FOUR years ago, in the preface to his very important and elaborate "Monograph of European Trichoptera," Mr. McLachlan promised to continue from time to time the supplemental notices of which the necessity of the case had already caused two to be appended to the original work. The first of these has just (June) been published; it adds nearly fifty species to those described in the Monograph and its Supplements. Some new forms are noticed to which it has seemed right to assign the rank of varieties, and there is a great deal of additional information as to localities. While all the species in the original work have been passed under review, in one or two instances those belonging to some genera have been thoroughly revised. Very few new genera are indicated, and the author thinks the time has not yet arrived for a complete subdivision of some of the larger generic groups as now constituted. All but six of the additional species are from within the limits of Europe proper, proving how hazardous it would be to conjecture as yet as to the number forming part of the European fauna. While ready and liberal help has been afforded towards the work of this Supplement by many of the author's friends and correspondents, yet it is by one above all the others that the material for it has been accumulated; for to the labours of the Rev. A. E. Eaton in Italy, Portugal, Madeira, the Canary Islands, and elsewhere, the author stands indebted for more than three-fifths of the new species, and though Mr. Eaton is well known as an acute, indefatigable, and successful entomologist, does the remark press less home that "if a foreigner making short holiday tours through certain districts previously unexplored (so far as the Trichoptera are concerned) can produce such results, it is needless to call attention to what *might be done* by residents in the districts?"

Among the genera which have been revised we note *Sericostoma*, which it is now proposed to divide into two groups, i.e. (A) with the Maxillary palpi in the male very prominent and scarcely hairy; and (B) with the Maxillary palpi in the male slightly prominent and very hairy.

Additional and valuable information is given concerning the singular forms belonging to the genus *Helicopsyche*. The author now acknowledges three European species, while he seems to think that the number will yet be greatly increased. The three species at present stand as *H. speruta*, *H. lusitanica*, and *H. revelieri*. The last species equals *H. shuttleworthii*, and was bred in large numbers by M. Revelière, who found the larvæ in very great abundance in a stream near Porto Vecchio, Corsica. The imago is to be found all the year round, but it seems to

require a certain degree of warmth for its emergence, which is always effected in the daytime. The larvæ and pupæ can exist in a very scanty supply of moisture; indeed some specimens which were left untended for many days were found quite active though all the water had evaporated from them, and the sand in which they were was only moist. The building material of the helix-like cases is fine sand-grains; each case forms fully two and a half whorls; the cement-like substance used to bind the sand-grains together is often applied so thickly that the individual grains are inconspicuous.

In the genus *Setodes*, Mr. McLachlan has discovered a character in the posterior wings which (with others) enables the species of the genus as it now stands to arrange themselves into two sharply defined groups (which will be hereafter considered genera). This character is the presence or absence in the posterior wings of a fold above the apical fork known as No. 5. *S. punctata* and its allies belong to the group in which the fold is absent, while *S. tineiformis*, Curt., &c., belong to the group with the fold.

This "First Additional Supplement" is illustrated by seven plates engraved from the author's drawings in a very creditable manner by Mr. G. Jarman. As the necessities of the case arise, we are promised a "Second Additional Supplement," which will be as gladly welcomed by those taking an interest in this group of insects as the present one is sure to be.

LETTERS TO THE EDITOR

- [The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]
- [The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Lœwy's New Telescope System

IN the June number of the *Bulletin Astronomique* there is an important article by M. Lœwy entitled "Description d'un nouveau Système de Télescope," on which, with your permission, I would offer some remarks.

M. Lœwy gives the two possible dispositions or arrangements that allow the principle of the *equatorial* could be applied to the reflecting telescope. He assumes certain optical and mechanical conditions, and on these treats the question exhaustively, giving tables showing the different sizes of the mirrors required and other data obtained by the use of formulæ based on those conditions.

The practical difficulties are also dealt with and suggestions made for forms of mountings. There is also a suggestion of the MM. Henry to close the mirrors from the open air by means of a parallel plate of glass to protect them from the effects of dust, moisture, &c.

This subject has a particular interest for me (as I have no doubt it has also for many others), and I have considered for some time the mechanical difficulties from a different point of view from that of M. Lœwy, coming thereby to conclusions differing considerably from those given by him. There is, of course, much to be said on such a subject as this, involving as it does so many points that can be dealt with in so many different ways, and some of these I should much like to say more on by and by; but at this holiday time of year I will only offer the following observations:—

1. It is of the first importance to reduce as much as possible the distance (δ) between the middle mirror of either optical combination or disposition and the focal plane.
2. By placing the upper bearing of the polar axis below instead of above the cross tube of either disposition, all the mechanical conditions that M. Lœwy has used can be advantageously varied.
3. The use of the floating polar axis described by me in the May number of the *Monthly Notices* of the Royal Astronomical Society enables this to be done.